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Technical Solution Assessment Methodology report

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Contents

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1 Executive summary

Excluding margin and contingency, the **total cost (capex + opex)** in the Bidder FT PCM is ███ ███████ that of the Budget Cost Model. This relatively small headline difference disguises some significant cost differences within certain subcategories[1].

Total capex and opex are broadly similar to Budget Cost Model (when differences in take-up assumption is accounted for).

Key drivers such as total network route length of the pass network are similar, giving us confidence that one of the key drivers of cost is reasonable.

In summary, the technical solution is robust, all key items we expect have been included, and we are confident the network and costing (subject to the above comments) is robust.

2 Introduction

2.1 Purpose of the report

The purpose of this report is to provide technical and cost input to KPMG's Single Bidder Solution Assessment Methodology (SAM) report. In particular, this report compares the actual cost in the final tender with the budget cost previously approved by Government. To support the cost comparison, this report assesses premises, network and resource volumes. Finally, to place the costs in context, the report provides an analysis which compares key input and output costs against industry benchmarks.

2.2 Information sources

There are four main sources of information used in this report:

- The Bidder's Final Tender Project Cost Model (the Bidder FT PCM) and associated Cost Memorandum
- The Bidder's other Final Tender (FT) response documents
- The DCCAE's Budget Cost Model of March 2018 (the "Budget Cost Model")
- The DCCAE's Benchmark Network Design[2] of October 2018 (the "Benchmark Network Design")
- Analysys Mason's cost benchmarks

2.3 Clarification process

In this section we describe the clarification process and subsequent evolution of the Bidder's PCM from ISDS through to Final Tender.

Following receipt in September 2017 of the Bidder's submission in response to ISDS, Analysys Mason assessed the Bidder's PCM for compliance with Commercial Question 4 and completed a PCM robustness report[3]. The PCM robustness report

- assessed the robustness of the Bidder's PCM
- set out feedback in respect of robustness criteria to be provided to the Bidder
- provided input to KPMG's assessment of robustness of the Bidder's PFM and
- assessed the avoidable costs and permitted expenditure.

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[2] The Benchmark Network Design is an independent network design carried out by the DCCAE.

[3] "PCM robustness report – ISDS response assessment" 30 January 2018, Ref: 22009069-52

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Following the workshops, Analysys Mason met with the Bidder on two separate occasions to further discuss costs:

- 24 July 2018 to clarify certain capex items, specifically unit costs for deployment tasks which would be carried out by subcontractors
- 7 August 2018 to clarify certain opex items including staffing levels and infrastructure rental.

Subsequently, the Bidder submitted a Draft Final Tender PCM (Draft FT PCM) on 16 August 2018[6]. Analysys Mason reviewed the PCM and prepared clarification questions which were issued to the Bidder on 17 August 2018 in advance of a workshop with the Bidder on 21 August 2018. The Bidder submitted responses to the clarification questions on the morning of the workshop. Analysys Mason supported a discussion of the responses with the Bidder during the workshop and the responses were noted by DCCAE. At this workshop, Analysys Mason also discussed feedback which had previously been provided to the Bidder regarding compliance of its PCM with Commercial Question 4.

The Bidder submitted two further iterations of the Draft FT PCM on 4 September 2018 and 10 September 2018. For each new iteration, Analysys Mason analysed the change in costs, provided feedback to the DCCAE and proposed clarifications questions to the DCCAE where applicable.

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[4] "AM inputs for capex workshops (for issue).pdf"

[5] The paper was titled: "1c e|net sse VFM Paper Draft.pdf"

[6] The Bidder submitted its first Draft FT PCM on 14 August however this was superseded by an updated version submitted on 16th August

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The Bidder submitted its Final Tender PCM (the Bidder FT PCM) on 18 September 2018. Analysys Mason prepared a compliance and robustness assessment report[7] for DCCAE which

- assessed compliance of the Bidder FT PCM in line with Volume 2, Section 6.3
- provided input to KPMG's assessment of compliance of the Bidder's Project Financial Model (PFM) in line with Volume 2, Section 6.3
- assessed robustness of the Bidder FT PCM in line with Volume 2, Section 6.4.

Finally, we issued tow further clarification questions regarding the connect network length and the unit cost of the cable material on 30th October 2018 and Bidder clarified these two points on the 1st November 2018.

2.4 Structure of this report

The remainder of the report is structured as follows:

- Section 3 sets out our comparison of the volumes in the Bidder FT PCM with the Budget Cost Model and the Benchmark Network Design
- Section 4 compares the cost of the Bidder FT PCM with the Budget Cost Model
  - Section 4.2 compares the overall cost in the two models
  - Section 4.3 compares the capital expenditure (capex) in the two models
  - Section 4.4 compares the unit costs in the two models
  - Section 4.5 compares the operational expenditure (opex) in the two models
- Section 5 sets out our benchmarking analysis
- Section 6 sets out our conclusion.

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[7] Final Tender PCM – compliance and robustness assessment, 20 September 2018, Ref: 2009069-384

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3 Volume assessment

3.1 Introduction

In this section we assess the Bidder's volume assumptions in three different areas:

- **Premises volumes** – includes the volume of premises passed and volume of premises connected during the Contract period
- **Network infrastructure volumes** – includes the network route length associated with both overhead and underground infrastructure of the initial network build and of the network to connect.
- **Resource volumes** – includes the staffing required to operate and maintain the network as well as to connect end-users

Each of the above areas is assessed against the assumptions taken in the Budget Cost Model.

Pass network and connect network

In this section we refer to the 'pass network' and the 'connect network'. The pass network is that part of the network between the core and a distribution point (inclusive) that is sufficiently close to end user premises, such that NGA broadband services can be provisioned within the service provisioning targets at the standard connection charge. The connect network is that part of the network between the distribution point and the end user premises that is constructed after the end user orders a connection.

3.2 Premises volume

3.2.1 Premises passed

We understand that OE need to "make ready" the poles and ducts before any third party can access the infrastructure to deploy their own fibre. OE propose to manage the making ready of the duct and pole infrastructure as a Major Infrastructure Project (MIP) throughout the deployment period.

The MIP team will be established and mobilised, subject to NBP award and contract between OE and the Bidder to:

- Manage NBP Intervention Area pole replacement – Design Information validation, work scheduling,
- Manage NBP Intervention Area sub-duct access requests – Design Information validation, work scheduling, T2 licencing, blockage reconciliation, completion confirmation
- Manage NBP Intervention Area OE building access
- Finance and agreed operational reporting as necessary.

OE will only make ready the infrastructure after they receive an order for identified poles and ducts. In addition, OE have informed the Bidder that:
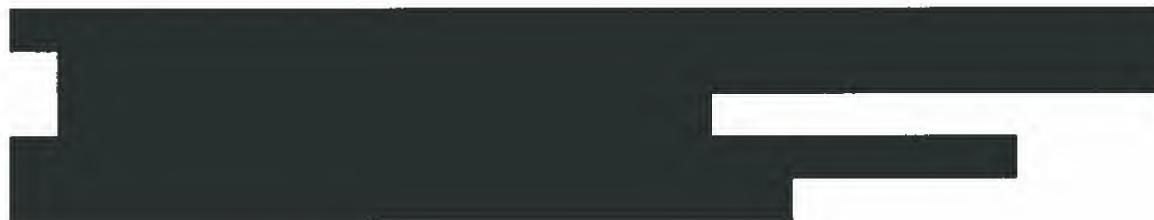
These constraints apply to all users of OE pole and duct infrastructure and not just to the Bidder.
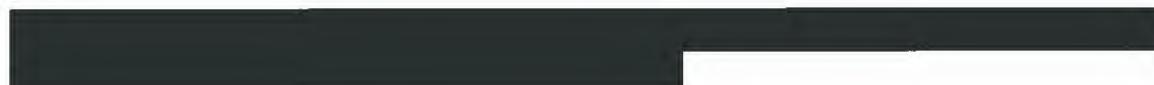
Figure 3.1: Deployment profile comparison between the Budget Cost Model and the Bidder FT PCM for

premises in the Intervention Area (IA) [Source: the Bidder, Analysys Mason, 2018]

3.2.2 Premises connected

. This is illustrated in Figure 3.2.

Figure 3.2: First time connection profile comparison between the Budget Cost Model and the Bidder FT PCM [Source: the Bidder, Analysys Mason, 2018]

As a result, there are ▮▮▮▮▮ connected premises in the Bidder FT PCM than in the Budget Cost Model (▮▮▮▮▮▮▮▮▮▮). This means that when comparing connection capex, it is important to conduct the comparison on a per connection basis (i.e. unit capex) rather than on a total connection capex basis. See Section 4.3.5 for more details on this analysis.

3.2.3 Conclusion regarding premises volumes

- The Bidder assumes 535k premises passed in the intervention area (IA) which is in line with the latest GeoDirectory data issued by the DCCAE

- The Bidder FT PCM assumes a ▮▮▮ deployment which is in line with its deployment plan submission and the Contract updated requirements

- The Bidder assumes a ▮▮▮▮▮▮ take-up than in the Budget Cost Model leading to ▮▮▮ ▮▮▮ first time connections by the end of Year 25. This means that total connection capex will be higher than the Budget Cost Model. We do not comment in this report on the

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appropriateness of the take-up projections as that is a demand-side matter and not in the scope of the technical assessment.

3.3 Network infrastructure volume

In this section, we compare network infrastructure volumes (network route length and number of poles). The initial comparison in Figure 3.3 is between the Budget Cost Model and the Bidder FT PCM.

Figure 3.3: Network volume comparison between the Bidder FT PCM and the Budget Cost Model [Source: The Bidder, Tera, Analysys Mason, 2018]

Overall, the differences in total network route length and total number of poles between the Bidder FT PCM and the Budget Cost Model are less than 5%. We note that the underground proportion represents 14% of the total network route length in the Bidder FT PCM compared to 10% in the Budget Cost Model. Part of the reason for this is that, as set out in Section 4.2.2, the Budget Cost Model assumes a completely different network design compared to the Bidder FT PCM, and therefore the Bidder FT PCM is more appropriate as it reflects the Bidder's own design.

As mentioned above, the Budget Cost Model assumed a network design that was different from the Bidder's network design. Therefore, DCCAE developed another model, termed the Benchmark Network Design, to better reflect the Bidder's network design and to enable a like-for-like comparison. Please note that the Benchmark Network Design is not used for Budget purposes but is only used to check the Design of the network. Figure 3.4 compares the total network volumes assumed in the Bidder FT PCM with those in the Benchmark Network Design.

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[10] UG = underground

[11] OH = overhead

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Figure 3.4: Network volume comparison between the Bidder FT PCM and the Benchmark Network Design
[Source: The Bidder, Tera, Analysys Mason, 2018]

	Benchmark Network Design		Bidder FT PCM	
	Total	Of which new	Total	Of which new
Total Network length (km)	�__	�__	▄	▄
Total UG network length (km)	▄	▪	▄	▪
UG network in Excluded Area	▄	▪	▄	▪
UG network in Intervention Area	▄	▪	▄	▪
Total OH network length (km)	▄	▄	▄	▄
OH network in Excluded Area	▄	▄	▄	▄
OH network in Intervention Area	▄	▄	▄	▄
Total # of poles	▄	▄	▄	▄
# of poles in Excluded Area	▄	▄	▄	❘
# of poles in Intervention Area	▄	▄	▄	▄

In Figure 3.4, the total network route length in the Bidder FT PCM is approximately 1% greater than in the Benchmark Network Design. The Bidder FT PCM also assumes a similar proportion of total network route length is underground compared to the Benchmark Network Design (14% and 13% respectively).

Finally, the number of poles in the Bidder FT PCM is 7% greater than in the Benchmark Network Design.

We believe that the differences between the Bidder's assumptions in the Bidder FT PCM and the DCCAE's assumptions in the Benchmark Network Design in terms of overall network route length and number of poles are within an acceptable tolerance.

A more detailed network route length comparison between the Bidder FT PCM assumptions and the Benchmark Network Design is provided in Annex A for the network to pass and the network to connect.

Connect network route length

For the BCM 2018, the exact coordinates of IA premises were not available for modelling purposes. Therefore, since it was not possible to calculate the exact length of the connect network to connect each premises to a secondary splitter on the pass network, a standard connection cost was assumed for all premises. This standard connection cost, which includes both labour and material for the final drop cable, was derived from the regulatory model used by Comreg for the copper network. Therefore, it is not possible to directly compare the connect network length proposed by the Bidder to the BCM.

However, for the Benchmark Network Design, the exact coordinates of IA premises were obtained through the latest version of GeoDirectory. This allowed a more detailed modelling of the network to connect. As illustrated in Figure 3.5, the network to connect was split into three distinct categories:

- A - Dedicated vertical routes to the connect network
- B - Dedicated horizontal routes to the connect network
- C - Shared horizontal routes between the distribution network and the connect network

Figure 3.5: Decomposition of routes in the Connect network [Source: Analysys Mason, 2018]
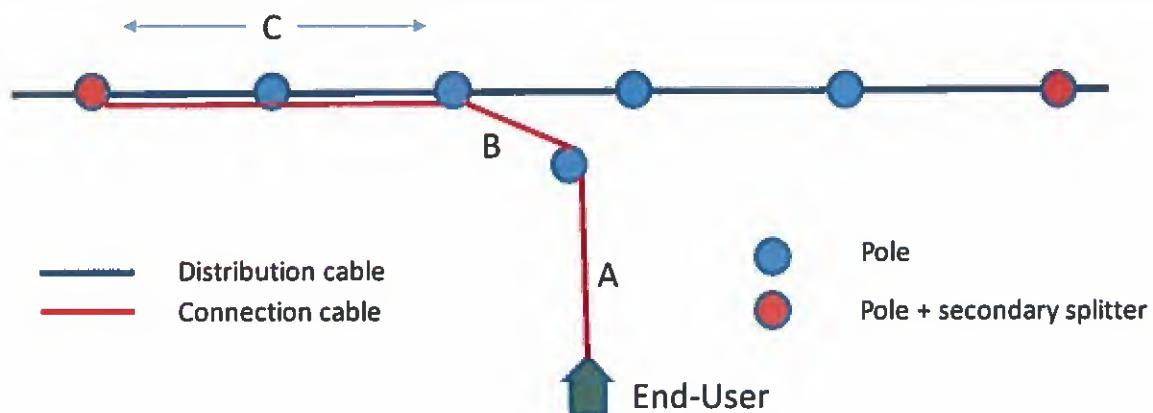
The total unique connect network route length is ▉▉▉ as illustrated in Annex A. However, this route network length does not include the routes which are shared between the distribution network and the connect network (i.e. route segment C in Figure 3.5). This is to avoid double counting of network route length (i.e. shared route length was included in the network to pass route length only).

Based on the Benchmark Network Design, the total shared route length is ▉▉▉. Therefore, the average cable length per premises connected can be obtained as follows:

Average cable connection length in Benchmark Network Design = (total unique connect network route length + total shared route length)/total number of premises

Average cable connection length in Benchmark Network Design = ▉▉▉▉

▉▉▉▉▉▉▉▉▉▉

We issued a clarification to the bidder on the 30th October 2018 to query this difference and the Bidder responded that it had included the following assumptions in its an average cable connection length per premises connected which were not accounted for the Benchmark Network Design:

3.3.2 Conclusion regarding network infrastructure volumes

- The Bidder FT PCM and the Budget Cost Model assume similar network volumes although the underlying network designs are different.

- To enable a like-for-like comparison, the network volumes in the Bidder FT PCM have been verified by an independent Benchmark Network Design and we conclude that the Bidder's network design and associated network volumes are robust.

- The difference in overall network route length between the Bidder FT PCM and the Benchmark Network Design is very small (~1%) and therefore raises no material concerns.

- The difference in the total number of poles between the Bidder FT PCM and the Benchmark Network Design is 7%; we believe this is within an acceptable tolerance given the desk-based nature of the network design activities undertaken by the Bidder and the DCCAE.

- The difference in inter-pole distance for newly constructed poles between the Bidder FT PCM and the Benchmark Network Design is ▇. The Bidder FT PCM assumes ▇ whereas the Budget Cost Model assumes ▇. The impact in terms of total capex is relatively small, therefore we do not have any major concerns with the inter-pole distance assumption.

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3.4 Resource volume

In this section we assess the Bidder's resource volume assumptions in three different areas:

- Resources required for the pass network
- Resources required for the connect network
- Resources required to repair and maintain the network

3.4.1 Resources required for the pass network

The resources required to deploy the pass network are implicitly accounted for in the various labour rates from key subcontractors. For example, the FT PCM includes a labour unit cost (per metre) to deploy aerial and underground fibre as well as a labour unit cost (per pole) to install poles. Therefore, no explicit volume is provided for the number of staff required to deploy the network to pass. We believe this to be a reasonable approach.

The Bidder assumes that the pass network will be deployed by subcontractors who will be managed by an in-house team of resources. The Bidder FT PCM refers to the in-house staff that will manage the construction of the pass network as Buildco staff. The volumes for these staff are expressed in the Bidder FT PCM as full-time equivalents (FTEs) and illustrated in Figure 3.6 and Figure 3.7.

Figure 3.6: Bidder Buildco Staff FTEs by year after contract award and function [Source: Analysys Mason, 2018]

Figure 3.7: Peak Buildco FTEs by function [Source: Analysys Mason, 2018]
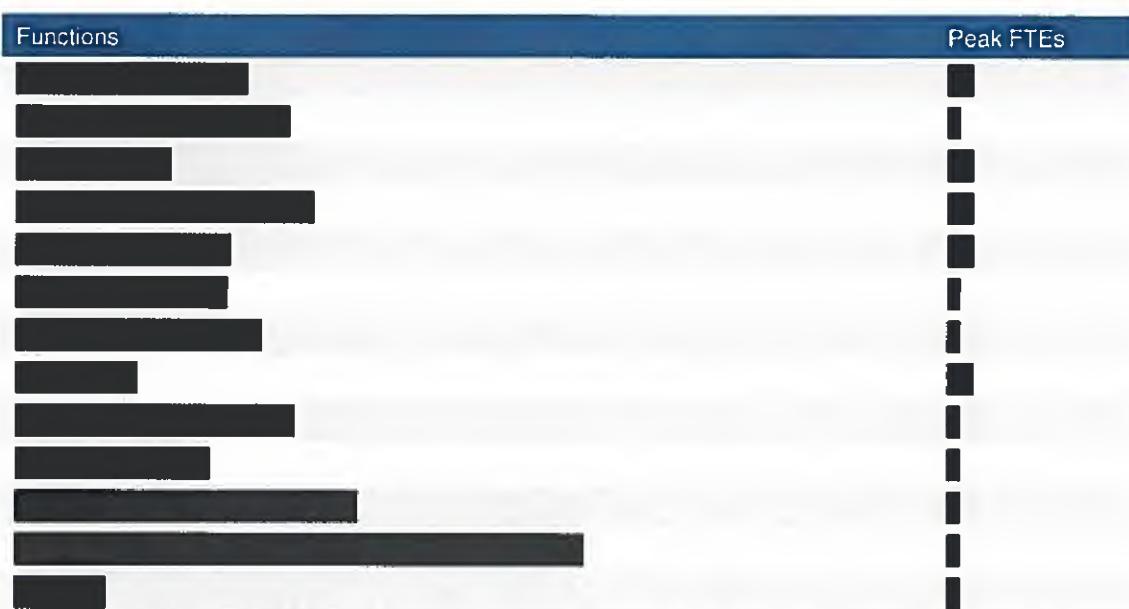
In our view the in-house organisation to manage the deployment of the network includes all necessary functions that we would expect and is appropriately dimensioned with a reasonable number of FTEs for each function.

Furthermore, the DCCAE's deployment evaluation team has confirmed that the Bidder has provisioned sufficient resources to deploy the network according to its deployment plan and meet the associated programme timeline.

Conclusion regarding resources required for the network to pass

- The Bidder has provisioned labour unit costs for a number of network elements to be deployed which we believe to be a reasonable approach
- The Bidder has provisioned sufficient resources to manage the deployment of the pass network according to its deployment plan and meet the associated programme timeline.

3.4.2 Resources required for the connect network

The work to construct the connect network will take place over the entire 25-year duration of the contract and involves the connection of each end user and installation of customer premises equipment as orders are received. The Bidder assumes that the connect network will be constructed by a subset of those subcontractors who will deploy the pass network.

As for the pass network, the resources required to deploy the connect network are implicitly accounted for in the various labour rates from key subcontractors. Therefore, no explicit volume is provided for the number of staff required to connect premises. We believe this approach to be reasonable.

The premises network connections, performed by subcontractors, will be managed by ▇▇▇▇▇▇
▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇. The volumes for these staff are expressed in the Bidder FT PCM as full-time equivalents (FTEs) and illustrated in Figure 3.8.

Figure 3.8: Bidder Connection Capex Staff FTEs by year after contract award and function [Source: Analysys Mason, 2018]

In our view the in-house organisation to manage the construction of the connect network includes all necessary functions and is appropriately dimensioned with a reasonable number of FTEs for each function.

Conclusion regarding resources for the connect network

- The Bidder has provisioned labour unit costs for a number of network elements to be deployed for the network to connect which we believe to be a reasonable approach
- We conclude that the Bidder has provisioned sufficient resources to deploy the connect network according to its connection plan and to meet the associated programme timeline.

3.4.3 Resources to repair and maintain the network

Network repair and maintenance constitutes the single largest network-related opex in the Bidder FT PCM[13]. To dimension its network repair and maintenance function the Bidder FT PCM assumes a network fault rate of ■ faults per 100 connections per annum compared to 8.0 faults per 100 connections per annum in the Budget Cost Model[14].

The Bidder FT PCM assumes a total of ▌ staff per repair crew and a capacity of ▌ faults per day per crew resulting in a total of ■ front line repair crew[15] by Year 25. The Budget Cost Model assumes the same number of staff per repair crew but a higher repair capacity of ▌ faults per day per crew. The differing assumptions regarding fault rates and repair crew capacity in the Bidder FT PCM and the Budget Cost Model effectively result in a similar number of crew days to resolve faults for a given number of connections. Therefore, in the round, we believe that the number of crew days to resolve faults in the network is reasonable.

Furthermore, the DCCAE's operational evaluation team has confirmed that the Bidder has provisioned sufficient resources in its network operations centre (NOC), front desk, field force and operational performance teams to operate and maintain the network to deliver the service level agreements (SLAs).

Conclusion regarding resource volumes to maintain the network

- Overall, we are broadly comfortable with the resources assumed by the Bidder to repair faults in the network as it is similar to the volume of staff assumed in the Budget Cost Model.
  — The Bidder's assumption of ■ faults per 100 lines per annum is reasonable and in line with the contract and our experience.
  — The dimensioning of the Bidder's team to fix faults is in line with the assumed number of faults per day and is slightly conservative (i.e. ▌ faults per team per day should be easily achieved) but not unreasonable.
- The DCCAE's operational evaluation team has confirmed that the Bidder has provisioned sufficient resources in its network operations centre (NOC), front desk, field force and operational performance teams to operate and maintain the network to deliver the service level agreements (SLAs)

- We recommend DCCAE to closely monitor the efficiency of fault repairs per team per day.

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3.5 Overall conclusion regarding volumes

Despite the differences in underlying network design between the Budget Cost Model and the Bidder FT PCM, we have been able to conclude that most of the key volumes (relating to premises, network infrastructure and resources) in the Bidder FT PCM discussed here are robust and hence those parts of the Bidder's response relating to volume are acceptable.

4 Budget comparison

4.1 Introduction

In this section we compare the cost[16] in the Bidder FT PCM with the Budget Cost Model under the following headings:

- overall cost including a discussion of the key differences between the two models
- capex including a comparison of initial capex, replacement capex and capex to connect
- capex unit costs including a discussion of the most material unit cost drivers
- opex including Contract Assumptions

We note that the Budget Cost Model used for this comparison is the March 2018 Budget Cost Model (BCM 2018) which assumes that poles and duct infrastructure is either deployed or rented by the Bidder in the 300k Extension area.

This section follows the volume assessment section because we need to understand if there are any differences in volumes and account for these in any comparison of absolute costs. For example, the difference in total cable length for the connect network is considered further in Section 4.3.5.

4.2 Overall budget comparison

4.2.1 Introduction

The Government's public spending code requires a comparison of the Bidder FT PCM with the original Budget Cost Model.

In section 4.2.2, we first explain the key differences between the FT PCM and the Budget Cost Model assumptions which means both models cannot be compared on a like-for-like basis at a granular level.

In section 4.2.3, we provide an overall costs comparison between the FT PCM and the Budget Cost Model.

4.2.2 Key differences between the Bidder FT PCM and the Budget Cost Model

The Bidder's network design evolved between the time the Budget Cost Model was developed and the time the Bidder FT PCM was submitted. Therefore, there are many differences between the

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[16] All costs in this report are undiscounted.

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Bidder FT PCM and the Budget Cost Model and the two cost models cannot be compared on a like-for-like basis at a granular level.

However, the Government's public spending code requires a comparison of the Bidder FT PCM with the original Budget Cost Model and this section sets out that comparison.

Figure 4.1 provides a non-exhaustive list of the main different assumptions between the Bidder FT PCM and the Budget Cost Model along with an approximate calculation of the gross contribution of each item to the total difference in capex and opex[17].

Figure 4.1: Main different assumptions between the Bidder FT PCM and the Budget Cost Model [Source: Analysys Mason, 2018]

Item	Budget Cost Model	Bidder FT PCM	Indicative gross contribution to total cost difference[18]
Network Design			
Deployment period			
Technology			
Infrastructure rental			
Unit cost of cable			
Contract assumptions			
OSS/BSS rental			
OSS/BSS Change			
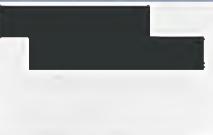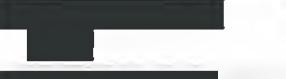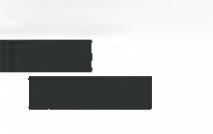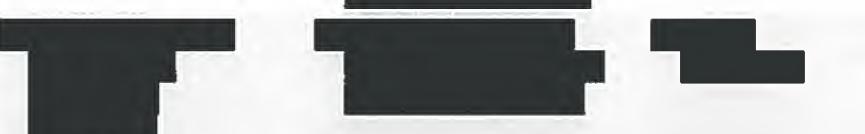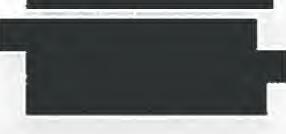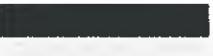
[17] The gross contribution to cost difference for opex is calculated over 25 years.

[19] The XGS PON proposed by the Bidder provides four times the download speed and 8 times the upload speed compared to that assumed in the BCM

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Item	Budget Cost Model	Bidder FT PCM	Indicative gross contribution to total cost difference[18]
request			
National backhaul network			
Total connections			
Replacement of cables			
Network O&M			
Overheads			
Margin and contingency			
Other opex			
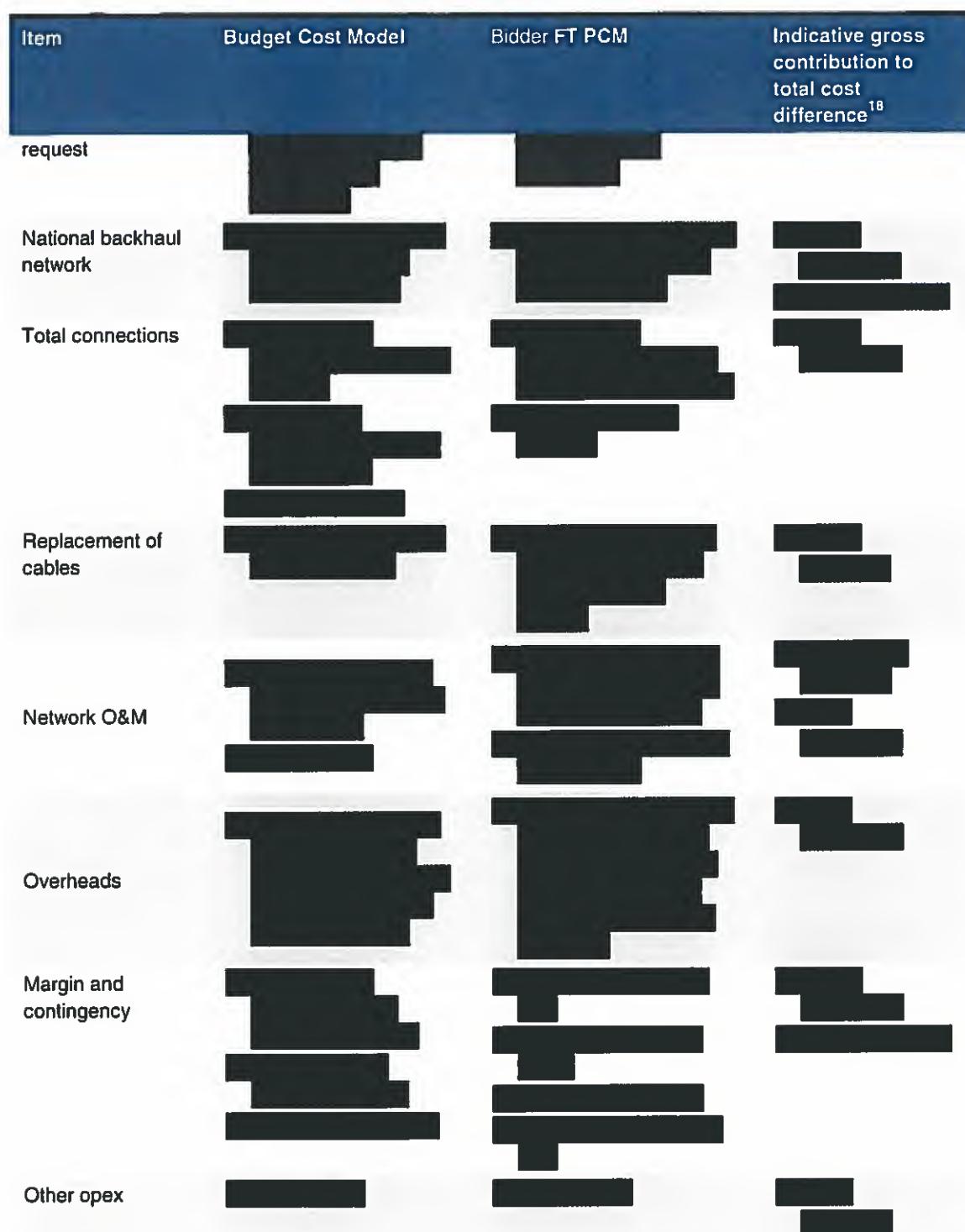
4.2.3 Budget comparison with FT PCM

To fulfil this requirement, we provide a comparison of the total cost, capex, opex and margin and contingency ("M&C") in Figure 4.2 below.

M&C are an overarching issue with both commercial and technical aspects. For this reason, and for clarity in this report, we undertake our assessment of costs with M&C being excluded. The commercial team, with our input, has issued some clarifications with the Bidder on the scope and nature of the M&C items.

Figure 4.2: Total cost comparison between Budget Cost Model and Bidder FT PCM in EUR million (over 25 years) [Source: the Bidder, Analysys Mason, 2018]

	Budget Cost Model	Bidder FT PCM	Absolute difference	Difference %
Total capex (excluding M&C)	■	■	■	■
Total opex (excluding margin and contingency)	■	■	■	■
Total capex and opex (excluding M&C)	■	■	■	■
Capex M&C	■	■	■	■
Opex M&C	▌	■	■	■
Total M&C	■	■	■	■
Total capex and opex (including M&C)	■	■	■	■

Even though the Budget Cost Model is based on a different network design to the Bidder FT PCM, the total cost difference excluding margin and contingency is relatively small (the Bidder FT PCM cost is ▇▇▇▇ the Budget Cost Model).

4.2.4 Conclusion regarding overall cost

Excluding margin and contingency, the **total cost (capex + opex)** in the Bidder FT PCM is ▇▇ ▇▇▇ than that of the Budget Cost Model. ▇▇▇▇▇▇▇▇

These differences are further analysed in Sections 4.3 and 4.5.

The **total capex** in the Bidder FT PCM is ▇▇▇▇ than that of the Budget Cost Model while **total opex** is ▇▇▇. The greater capex is mainly due to a difference in capex to connect:

- The Bidder FT PCM assumes ▇▇ more connections than the Budget Cost Model
- The Bidder FT PCM assumes a capex to connect per premises that is ▇▇▇▇ than in the Budget Cost Model

Capex and opex differences are further examined in Sections 4.3 and 4.5 respectively.

Total margin and contingency in the Bidder FT PCM is ███████████ than in the Budget Cost Model[20]. ██

Including margin and contingency, the total cost in the Bidder FT PCM is █████████ than that of the Budget Cost Model.

4.3 Capex comparison

4.3.1 Introduction

In this section we compare at a more detailed level the capex in the Bidder FT PCM with the capex in the Budget Cost Model including:

- Overall capex
- Initial capex
- Replacement capex and
- Capex to connect.

As before, we focus our analysis on costs excluding margin and contingency.

4.3.2 Overall capex

The total capex in the Bidder FT PCM is compared against the total capex from the Budget Cost Model in Figure 4.3 and analysed in subsequent sections.

Figure 4.3: Total capex comparison in EUR million [Source: the Bidder, Analysys Mason, 2018]

	Budget Cost Model	Bidder FT PCM	Absolute difference	Difference %
Capex to Pass (excluding M&C)	■	■	▌	■
Capex to Connect (excluding M&C)	■	■	■	■
OSS/BSS (excluding M&C)	■	■	▌	■
Total capex (excluding M&C)	■	■	■	■
M&C	■	■	■	■
Total capex (including M&C)	■	■	▌	■

██

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Excluding M&C the Bidder FT PCM assumes an overall capex that is ▮▮▮▮▮▮▮ than the Budget Cost Model.

The total capex to pass and total capex for OSS/BSS are very similar between the Bidder FT PCM and the Budget Cost Model. However, a significant discrepancy can be observed for the capex to connect, which is explained by the following factors:

- a significantly higher number of connections assumed in the Bidder FT PCM compared to the Budget Cost Model (see Section 3.2.2 on connection volumes) and
- a significantly higher total connection cost per premises assumed in the Bidder FT PCM compared to the Budget Cost Model (See Section 4.3.5 on connect capex).

4.3.3 Initial capex

Figure 4.4 compares initial capex[21] in the Bidder FT PCM and the Budget Cost Model.

Figure 4.4: Initial capex comparison in EUR million [Source: the Bidder, Analysys Mason, 2018]

	Budget Cost Model	Bidder FT PCM	Absolute difference	Difference %
Capex to Pass	▮	▮	▮	▮
Capex to Connect	▮	▮	▮	▮
OSS/BSS	▮	▮	▮	▮
Total Capex (excluding M&C)	▮	▮	▮	▮
M&C	▮	▮	▮	▮
Total Capex (including M&C)	▮	▮	▮	▮

Excluding margin and contingency the Bidder FT PCM assumes a total initial capex that is ▮▮▮ ▮▮▮ than the Budget Cost Model.

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[21] Initial capex is defined as the capex to initially build the network and connect customers and excludes any replacement capex through the Contract Duration. Replacement capex is the capex required to replace part of the infrastructure due to tear and wear and/or technology obsolescence.

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4.3.4 Replacement capex

Figure 4.5 compares replacement capex in the Bidder FT PCM and the Budget Cost Model.

Figure 4.5: Replacement capex comparison in EUR million [Source: the Bidder, Analysys Mason, 2018]

	Budget Cost Model	Bidder FT PCM	Absolute difference	Difference %
Capex to Pass	■	▮	■	■
Capex to Connect	■	■	■	■
OSS/BSS	■	■	▮	■
Total Capex (excluding M&C)	■	■	■	■
M&C	■	■	▮	■
Total Capex (including M&C)	■	■	■	■

Excluding margin and contingency the Bidder FT PCM assumes a total replacement capex that is ▮▮▮▮ than the Budget Cost Model. The main reason for this difference is that unlike the Budget Cost Model, the Bidder FT PCM assumes that network cables will not need to be replaced for the duration of the contract, and that the active equipment will have a single replacement cycle rather than three.

In our view the Bidder's assumptions regarding cable replacement are slightly aggressive but reasonable given the 25-year contract duration. If the contract duration were longer, we would expect some allowance for replacement of network cables and/or a greater allowance for repair and maintenance.

We note that the Bidder has assumed adequate replacement capex for active equipment as well as OSS/BSS (termed "OLT refresh" and "OSS/BSS refresh" respectively in the PCM).

We also note that the Bidder has assumed an appropriate maintenance program for poles and has provisioned some opex to replace its own poles throughout the Contract Duration.

4.3.5 Capex to connect analysis

Figure 4.6 provides a breakdown of the capex to connect per premises.

Figure 4.6: Capex to connect comparison [Source: the Bidder, Analysys Mason, 2018]

	Budget Cost Model	Bidder FT PCM	Absolute difference	Difference %
Initial capex to connect (EUR million)	■	■	■	■
Total first-time premises connected by year 25	■	■	■	■
Capex to connect per premises (EUR)	■	■	■	■

The table shows that the Bidder FT PCM assumes ■ more connections than the Budget Cost Model and a capex to connect per premises that is ■ than in the Budget Cost Model.

This discrepancy between the FT PCM and the BCM is explained in Figure 4.7.

Figure 4.7: Analysis of the discrepancy on connection capex per premises [Source: Analysys Mason, 2018]

Item	Total capex discrepancy[22],[23] (EURm)	Capex reduction in EUR per premises	Proportion of difference
Length of connect cable[24]	■	■	■
Unit cost of cable (material)	■	■	■
in-house service suite (labour)	■	■	■
ONTs (material)	■	■	■
other	■	■	■
Total	■	■	■

Figure 4.7 shows that the ■ per premises connected difference is mainly explained by four factors, namely differences in:

- in the length of connect cable per premises.
- the unit cost of connect cable
- the in-house service suite labour cost
- the ONT cost.

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[22] refers to the potential reduction in the PCM capex if input were taken from the BCM / Benchmark Network Design

[23] Total capex based on the total number of connected premises assumed by the Bidder

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Length of connect cable per premises

As explained in Section 3.3.2 of this report, the average connect network cable length per premises connected in the Bidder FT PCM is greater than that of the Budget Cost Model by approximately ▇▇. This accounts for ▇▇▇▇▇▇▇ difference per premises connected.

Unit cost of connect cable

In-house service suite

As described by the Bidder, *in-home installs are tailored to the individual service provider's needs and are largely dependent on the activities required to be performed in the home (Data port extension, TV Set top box installation, modem installation, Modem install with WiFi signal analysis etc.)*

In the BCM 2018, no allowance was made for in-house services as this is usually a neutral cost item which is compensated by a similar amount of revenues.

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[25] to a secondary splitter port on the distribution network

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In its FT PCM, the Bidder has explicitly costed ███ for in-home services and has also included a ███ revenue in its PFMT for these activities.

We have no concerns associated with the cost associated with in-house services.

ONTs

4.3.6 Conclusion regarding overall capex

- In our view the Bidder's assumptions regarding cable replacement are slightly aggressive but reasonable given the 25-year contract duration. If the contract duration were longer, we would expect some allowance for replacement of network cables and/or a greater allowance for repair and maintenance.

- The difference of ███ in capex to connect per premises is mainly explained by four factors:
  — differences in length of connect cable per premises connect,
  — unit cost of connect cable
  — in-house service suite
  — ONTs.

- The differences in length of connect cable per premises connect and in unit cost of connect cable account for ███████ difference in capex to connect per premises.

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4.4 Capex unit cost comparison

4.4.1 Introduction

In this section we first identify the most material unit costs driving capex in the Bidder FT PCM. We then compare the Bidder FT PCM unit costs against unit cost benchmarks including:

Finally, we provide an opinion on the reasonableness of these unit costs.

4.4.2 Identification of material capex unit costs

Our unit cost analysis is carried out after discounts[26] but excludes the margins and contingencies applied by the Bidder.

For the comparison, we selected only those unit costs which have a material impact on capex as illustrated in Figure 4.8.

Figure 4.8: Key unit costs [Source: Analysys Mason, 2018]

Item	Description	Bidder FT PCM total capex (EUR million)
Fibre cables (overhead and underground)	Cabling materials and labour	■
Poles	Pole materials and labour	■
Joints and splitters (incl. splice labour)	Jointing and splitters (including ODP) materials and labour	■
Trench	Civil works underground labour	■
ONT	ONT materials	■

As shown in Figure 4.8, the dominant unit cost driver is that associated with the fibre cables.
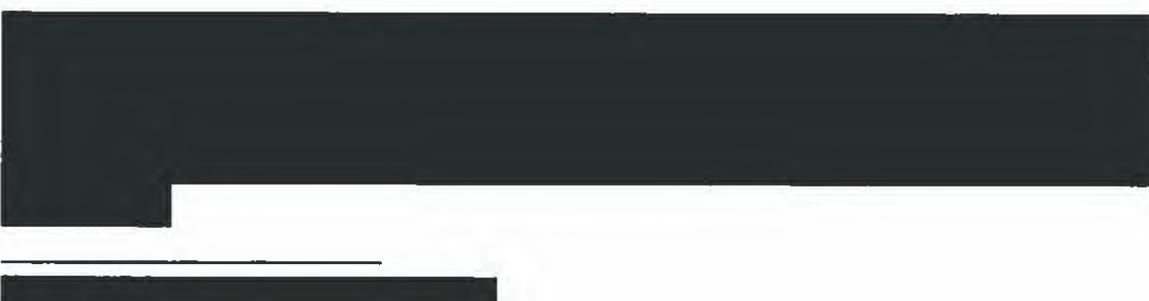
4.4.3 Benchmarking of fibre cable unit costs

In the network, different types of fibre cables are used (i.e. overhead cables vs underground cables), and each with a different number of fibre strands (e.g. 12, 24, 48, 96 fibres in the cable). To Benchmark the unit cost of fibre cables, we considered the most representative[27] fibre cable used in the Bidder's network design- ███████████████████████. In Figure 4.9, we benchmark the unit costs of a ████████████ against a number of benchmarks (see section 4.4.1).

Figure 4.9: Benchmarking of 12F overhead cable unit cost [Source: Analysys Mason, 2018]

In our analysis we differentiate between labour costs and material costs[28]. The labour cost is associated with the installation of the cable itself onto poles (or in underground ducts for underground cables). The material cost is associated with the cost of the cable itself, including the fibres within the cable.

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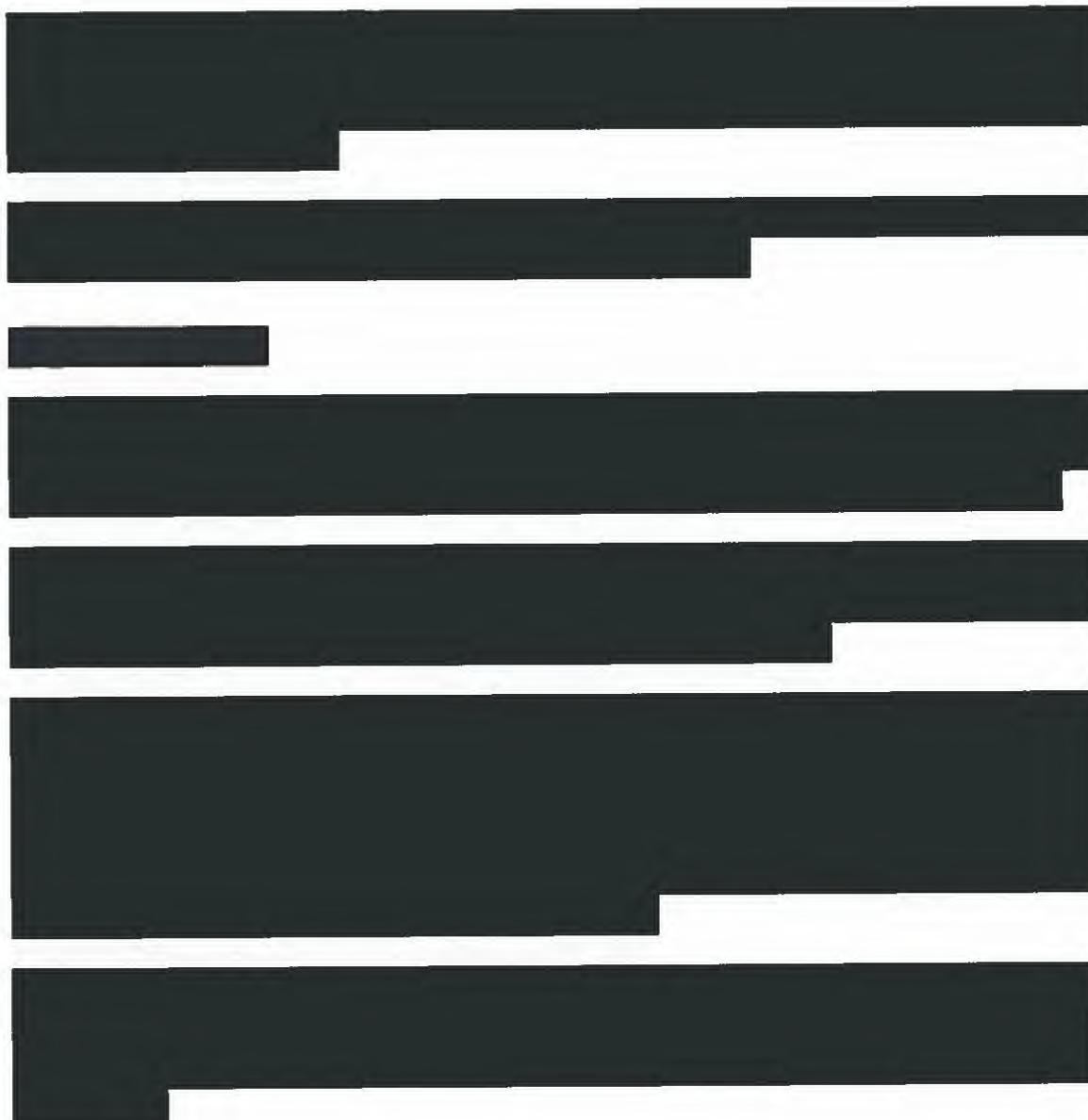
4.4.4 Conclusions regarding unit cost analysis

- The cost associated with cable installation and supply is the single largest capex item (see Figure 4.8).

4.5 Opex comparison

4.5.1 Introduction

In this section we first check the completeness of the opex model in the FT PCM. We then compare the opex in the FT PCM with the opex in the Budget Cost Model at a more detailed level. Finally, we provide an opinion on the reasonableness of individual opex categories.

As before, we focus our analysis on costs excluding margin and contingency.

4.5.2 Contract assumptions

We checked the FT PCM against the technical Contract Assumptions (CAs) set out in Volume 3 Schedule 6.2, Annex 5 and Annex 6 of the ISFT. We are satisfied that the technical CAs are correctly reflected in the Bidder's FT PCM as explained below.

4.5.3 Overall opex and detailed comparison

The total opex in the Bidder FT PCM is compared against the total opex from the Budget Cost Model in Figure 4.3 and analysed in subsequent sections. Note that we have grouped opex into eight categories in order to aid the comparison with the Budget Cost Model on a like-for-like basis.

Figure 4.10: Total opex comparison in EUR million [Source: the Bidder, Tera, Analysys Mason, 2018]

	Budget Cost Model	Bidder FT PCM	Absolute difference	Difference %
Network O&M	▮	▮	▮	▮
Pole and Duct rental	▮	▮	▮	▮
Co-lo rental	▮	▮	▮	▮
National backhaul	▮	▮	▮	▮
OSS/BSS rental + O&M + Licenses	▮	▮	▮	▮
OSS/BSS change request	▮	▮	▮	▮
Other opex	▮	▮	▮	▮
Non-network overheads	▮	▮	▮	▮
Total opex (excluding Margins and overheads)	▮	▮	▮	▮
Margins and contingencies	▮	▮	▮	▮
Total opex	▮	▮	▮	▮

Completeness of the opex model

We believe that all material opex elements have been included in the FT PCM.

Network O&M

The Bidder FT PCM assumes a network O&M cost that is ▮▮▮▮ than the Budget Cost Model. As explained in the *IT and communications* section below, with the increasing virtualisation of network functions, the distinction between "IT" and "Network" staff is getting more blurred and therefore IT and Network O&M categories should be considered together. The total costs for IT, communications and Network O&M is provided in Figure 4.11.

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30 ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

Figure 4.11: Comparison of Network O&M and IT + Communication opex [Source: Bidder, KPMG, Analysys Mason, 2018]

	Network O&M	IT + Communications	Total
Bidder FT PCM	■	■	■
Budget Cost Model	■	■	■

In the round, if we compare the total costs of for IT, communications and Network O&M, then the FT PCM and the Budget Cost model compare well (███████████). On that basis, the cost associated with Network O&M seems reasonable.

Pole and Duct rental

In its Cost Memorandum, the Bidder has indicated that the provision of pole access via a Major Infrastructure Project (MIP) facility has been agreed in principle with open eir. ██.

Another reason for this difference is that the Budget Cost Model assumed infrastructure re-use factors for poles and ducts whereas the Bidder FT PCM used the open eir infrastructure database which provides the actual location for each pole and duct and therefore increases the accuracy of infrastructure rental volume calculations. Effectively, the Bidder FT PCM network design had better information then was available to DCCAE at the time the Budget Cost Model was prepared[31].

Finally, we note that the Bidder has only included poles that are outside of large exchange area, but we anticipate that 20% of poles will be inside of large exchange areas which carries a 20% premium rental cost. Therefore, this would potentially increase the total cost of poles by 4% which is not material.

As a result, the pole and duct rental costs seem reasonable.

Co-lo rental

Excluding margin and contingency the Bidder FT PCM assumes a co-location rental cost that is ████████████ the Budget Cost Model. The main reason for this difference is that the Bidder FT

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[31] The DCCAE's Benchmark Network Design (on which the volumes comparison in Section 2 is based) used the open eir database and hence has a similar level of accuracy to the Bidder FT PCM network design.

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PCM is designed around ▇ rented colocation facilities compared to ▇ in the Budget Cost Model. This difference is therefore understandable, and the costs seem reasonable.

National backhaul

The Budget Cost Model assumes a capex model for national backhaul and so allows for zero opex under this category. ▇▇. For reference, the capex provisioned for in the BCM for the core network was ▇▇▇▇▇▇▇▇.

An opex for national backhaul is consistent with the Bidder's operational model and cost in the Bidder FT PCM seems reasonable.

OSS/BSS rental + O&M + Licenses

The OSS/BSS rental + O&M + Licenses costs category includes:

- ▇▇▇ for renting hardware/virtual machines from ▇▇▇
- ▇▇▇ for firewall
- ▇▇▇ in licenses for the different OSS/BSS software components
- ▇▇▇ in O&M which includes bug fixes and software upgrades
- ▇▇▇ for other costs.

The Budget Cost Model assumes a capex model for OSS/BSS where the solution would be owned by NBPco and hosted within its premises. As a result, the Budget Cost Model allows for zero opex under this category. The Bidder FT PCM assumes an opex model for OSS/BSS rental where the solution will be hosted in the cloud.

We believe that the OSS/BSS rental cost is consistent with the Bidder's operational model and that the OSS/BSS rental cost seems reasonable.

OSS/BSS change requests

Other opex

Remaining network costs which are categorised as other opex for the purposes of this review include vehicle rental and performance monitoring. Given its non-materiality, we do not have any major concerns regarding the other opex cost category.

Indirect and non-network costs

Non-network overheads (including property, insurance, marketing costs) as well as indirect network costs (e.g. finance and HR) are categorised as Indirect and non-network costs for the purposes of this review. Figure 4.12 provides a breakdown of non-network overheads.

Figure 4.12: Total Indirect and non-network opex comparison in EUR million [Source: the Bidder, KPMG, Analysys Mason, 2018]

We provide an opinion regarding the reasonableness of the most material costs in above figure- i.e.

- Insurance

- Indirect network cost
- General Management

- IT and communications

Insurance

[REDACTED]

Indirect network cost

In the Budget cost model, indirect network costs were calculated using a top-down and assumed that it represented ▊ of the overall network O&M budget. However, the Bidder FT PCM assumes that the vast majority of Indirect Network costs are commercial rates (▊ of indirect network costs in the FT PCM ▊).

[REDACTED]

General Management

[REDACTED]

We therefore believe the Bidder's staffing assumptions regarding general management to be conservative.

IT and communications

In the Budget cost model, IT and communications costs were calculated using a top-down approach and assumed that they represented ▊ of the overall Network O&M opex.

As mentioned in Section discussing *Network O&M*, due to the virtualisation of network functions, the distinction between "IT" and "Network" staff is getting more blurred and therefore IT and Network O&M categories should be considered together.

Since the cumulative costs of "IT and communications" and "Network O&M" compares well with the Budget Cost model, the cost for "IT and communications" seem reasonable.

4.5.4 Conclusion regarding opex

- The total opex in the Bidder FT PCM is similar to that of the Budget Cost Model.

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[32] We used our own "General Management" classification.
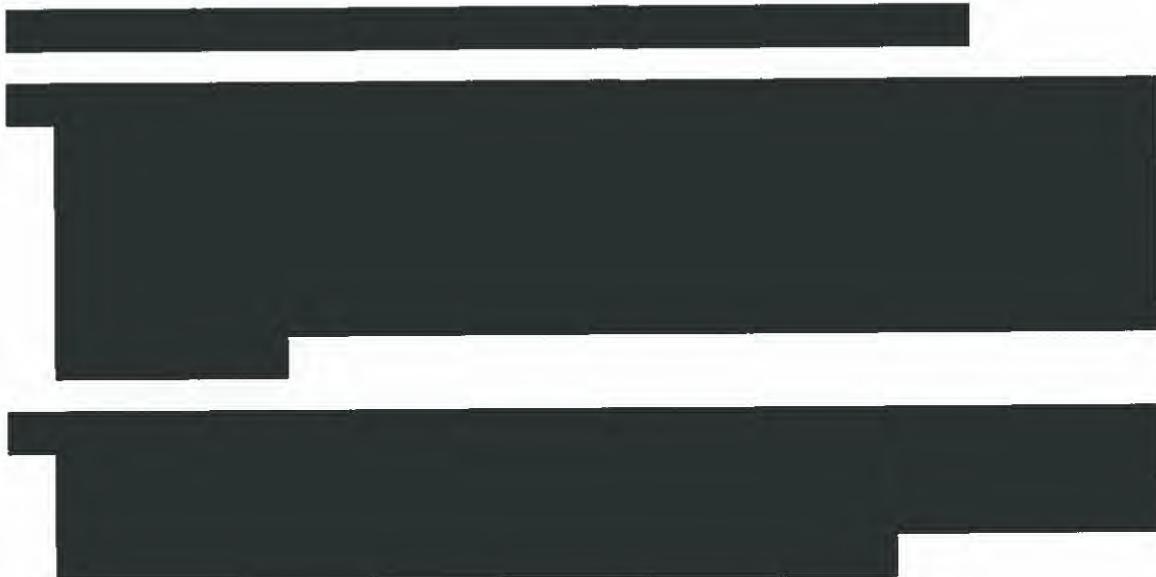
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- We believe the Bidder's organisation to be top heavy and the number of staff in the General Management category to be conservative.

4.6 Margin and Contingency analysis

4.6.1 Introduction

In this section, we analyse the margins and contingencies included by the Bidder in its PCM. Since this report is a technical report by nature, we do not distinguish between margins and contingencies. This is because we cannot comment on what level of margin would or would not be appropriate for a commercial company to take, based on the risks involved. Instead, we consider the relative level of additional costs provisioned by the Bidder to mitigate its risks.

4.6.2 Analysis of capex M&C

In general, in similar cost models, a typical benchmark for equivalent risk mitigation factor is typically between ▮▮▮▮▮▮ of the total cost.

We consider the margin and contingency applied to every cost item and convert them into an Equivalent Risk Mitigation Factor to ensure that we could compare all costs provisioned by the Bidder beyond and above standard costs on a uniform basis. The relationship between Equivalent Risk Mitigation Factor, contingency and margins is provided below:

- *Equivalent Risk Mitigation Factor = Contingency*
- *Equivalent Risk Mitigation Factor = 1/(1-Margin)*

The different margins and contingency related to capex assumed by the Bidder are summarised in Figure 4.13.

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Figure 4.13: Description of capex related margins and contingency [Source: Analysys Mason, 2018]

M&C description by the Bidder	Equivalent risk mitigation factor	Category of costs affected	Line items driven in the FT PCM

Build Cost Mark Up	▉	Pass Network capex	• Build costs
			  o Network Detailed Design
			  o Polling Material Cost
			  o Cabling Material Cost
			  o Tree trimming
			  o ODP and Jointing Materials
			  o Enclosures
			  o Splitters
			  o Fusion Splicing through connect
			  o Fusion Splicing splitters
			  o Test and commission
			  o Civil works underground
			  o Active Network Provision (BuildCo)
			  o Active Network Provision
			• BuildCo Staff Costs
			• SCP capex
			• BuildCo Overheads

Connection Mark-up	▉	Connect network capex	• Technical Refresh
			• Connection costs
			  o ONT Upgrade
			  o Polling Material Costs
			  o Cabling Material Cost
			  o Tree trimming
			  o ODP and Jointing Materials
			  o Civil works underground
			  o Customer Installation (New Connections)
			  o Customer Installation (Reconnections)
			• Connect Capex Staff Costs
			  o Build Design Authority
			  o Build Head of Commercial
			  o Control/ Admin
			  o Build Program/ Project office
			  o Build Design Authority
			  o Build Head of Commercial
			  o Control/ Admin
			  o Build Program/ Project office
			  o Manager/team leads

▉▉▉▉

▉▉▉▉

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M&C description by the Bidder	Equivalent risk mitigation factor	Category of costs affected	Line items driven in the FT PCM
			- Senior Management - Executive management - Consultants - Public Relations & Comms - General Counsel - Investor Relations & Comms - Finance / Capex / Supply Chain / Procurement Analyst - Directors / Advisors
OSS/BSS contingency	███████	OSS/BSS Development OSS/BSS refresh	All items associated with OSS/BSS development and refresh costs

Connect capex

We believe that the connect capex equivalent risk mitigation factor of █████ is broadly in line with the level of contingent costs in similar projects (high-end of our benchmark).

███
███
███
███

Pass Network

As explained in sections 4.3.3 and 5, we believe that the Pass Network costs excluding M&C's are broadly in line with other comparable benchmarks.

The Pass Network will be sub-contracted to Buildco, a company from the same financial group as NBPco. Buildco will therefore carry the risks associated with changes in the price of materials and equipment, which in the Bidder's opinion, justifies a ████ margin (converted to a ████ equivalent risk mitigating factor for the purpose of this analysis).

███
███

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[35] Equivalent to a ████ margin

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███

███
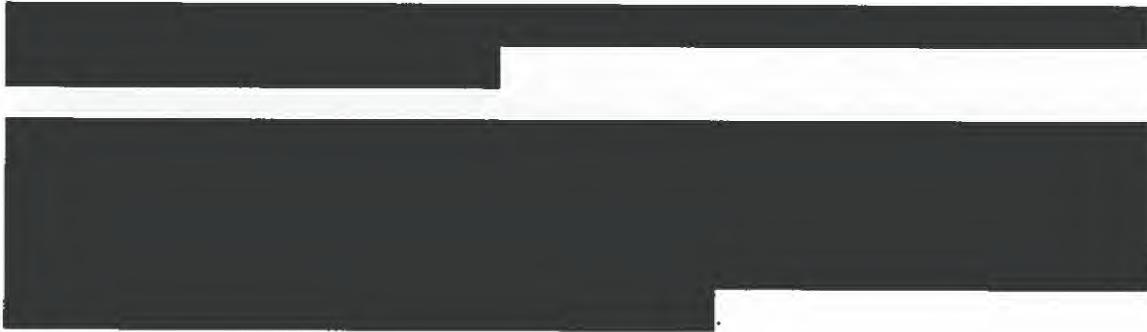
OSS/BSS

As demonstrated in Section 4.3.2, we believe that the OSS/BSS development costs excluding M&C's is broadly in line with our Budget Cost Model.

███[37]. We assume that the OSS/BSS will be deployed by NBPco and therefore all the risks associated with the OSS/BSS deployment will be with NBPco, which may justify a higher risk mitigation factor than other categories in this project (i.e. we would recommend a risk mitigation factor in the high-end of our benchmark- i.e. ███).

The Bidder has assumed a risk factor of ███ for OSS/BSS development costs which we believe to be high compared with the level of contingent costs in similar projects.

Other comments

We also note that for the same capex item, different equivalent risk mitigation factors are applied by the Bidder in its FT PCM. For example, if we take the labour and material costs associated with poles, poles deployed in the pass network are assigned with an equivalent risk mitigation factor of ███ whereas poles deployed as part of the connect network are assigned with an equivalent risk mitigation factor of ███ . We do not fully support the rational for such difference in risks, given that these are the same poles and similar staff will manage their deployment (Buildco for the pass network and the connect network staff for the connect network).

4.6.3 Analysis of opex M&C

Again, we have converted all margins and contingency into an Equivalent Risk Mitigation Factor to ensure that we could compare all costs provisioned by the Bidder beyond and above standard costs on a uniform basis.

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[36] ████████████████████████████

[37] However, this is an area to clarify in the final Contract

The different margins and contingency related to opex and applied by the Bidder to the FT PCM are summarised in Figure 4.14.

Figure 4.14: Description of opex related margins and contingency [Source: Analysys Mason, 2018]

M&C description by the Bidder	Equivalent risk mitigation factor	Category of costs affected	Line items driven in the FT PCM
Mark-up for contingency	▇	Opex for technical staff and vehicles	• Repair staff • NOC Staff • Field engineers • IT Staff • Technical staff • Pole testing and replacement • Vehicles • SCP O&M staff
Admin Mark-up for Contingency	▇	Opex for management staff	• Management staff • Senior management Staff • PMO staff • Executive management staff • Consultants • Connection management staff • Office fit out • Recruitment costs
Admin Contingency	▇	Opex associated with OSS/BSS	• ▇ hosting fee • Firewall • OSS/BSS Software licenses • Software O&M • OSS/BSS change requests

Mark-up for contingency

First, we believe that the term "mark-up for contingency" is highly confusing as it mixes margins and contingencies. This should be addressed and made more transparent as part of the recommended updated to the PCM before contract award.

As mentioned in Section 3.4, we believe that the Bidder adequately dimensioned its technical staff team resulting in an opex excluding margins which is in line with what we would expect. ▇▇▇▇▇▇▇

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[38] There is a requirement to clarify contract assumptions, and in particular what categories does the CA "Subcontractor change in labour rate" apply.

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Therefore, we would expect the equivalent risk mitigation factor to be on the high-end of our benchmark ███████. With a value of ████, we believe that the equivalent risk mitigation factor for technical staff and vehicles is high.

Admin Mark-up for Contingency

As explained in Section 4.5.3 of this report, we believe that the Bidder has been conservative regarding the volume of staff (and associated cost) in the general management category in its base costs in the PCM. As the cost associated with the general management category are conservative they may be interpreted as it already including contingent costs and therefore, the addition of an explicit risk mitigation factor in the FT PCM by the Bidder could be interpreted as a double count of contingency.

Admin Contingency
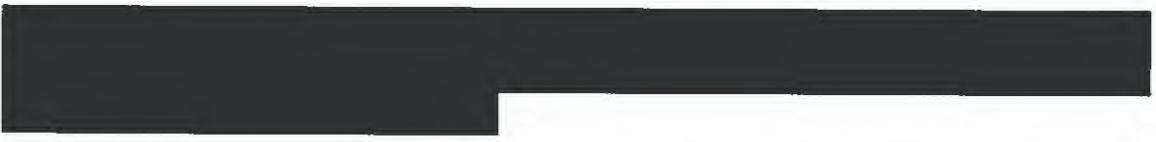
4.6.4 Conclusions

- In general, in similar cost model, a typical benchmark for equivalent risk mitigation factor is typically between ██████ of the total cost.

Capex related M&C

We believe that:

Opex related M&C

- The name of risk mitigation factors (such as Mark-up for contingency, Admin Mark-up for Contingency and Admin Contingency) is confusing and does not describe the parameters and assumptions in a transparent manner. This should be amended in the PCM in advance of contract award.
- We believe that the risk mitigation factor associated with technical staff and vehicles is high.

5   Benchmarking of cost per premises passed

5.1   Introduction

In this section, we benchmark the Bidder FT PCM initial build cost (also called initial capex to pass) with other FTTP deployments in Europe. A common benchmark measure used in the industry to compare initial build cost is Cost Per Premises Passed (CPPP).

Like in any benchmark, it is important to be cognisant that there are differences between the networks as that these differences can have a significant influence on the costs. The main differences between networks that influence CPPP are:

- Geotype
- Cost of labour
- Re-use of network infrastructure
- Scale of the network.

Geotype

One of the most significant parameters influencing the build cost in any FTTP network is the geotype in which the network is deployed. For example, FTTP networks in rural areas, where density of premises is relatively low, are more expensive per premises passed than FTTP networks in urban areas, where the density of premises is relatively high. This is because, in rural areas, the network infrastructure (i.e. cables) to be deployed per premises are significantly longer than in urban areas. Therefore, the geotype in which FTTP networks are deployed needs to be clearly identified to ensure a like-for-like comparison.

For the NBP, the most relevant benchmarks will be FTTP networks deployed in rural geotypes as the NBP Intervention Area is located in the most rural parts of Ireland covering the final 23% of premises.

Cost of labour

A significant cost associated with any network deployment is that associated with the cost of labour. The cost of labour can be very different between countries, and therefore the cost of labour has to be carefully considered in any benchmarking exercise.

For the NBP, benchmarks in Western Europe will be the most relevant (provided all other factors stay the same) as the cost of labour is similar to that in Ireland. In marked contrast, cost of labour in Eastern European countries is significantly lower than in Ireland.

Re-use of infrastructure

Another important factor to consider when benchmarking different networks in different countries is the level of re-use of existing infrastructure. In countries where there is significant infrastructure already deployed (e.g. underground ducts and overhead poles) and the infrastructure has spare capacity to accommodate the deployment of an FTTP network (i.e. space in the ducts and on the poles), the CPPP is significantly lower than in countries where the infrastructure has to be built from scratch.

Scale of the network

Economies of scale is also an important factor when benchmarking CPPP. The larger the network, the cheaper the material unit cost as volume discounts are usually applied by material and equipment vendors. The same applies for labour rates and subcontractors.

In the case of the Irish NBP, the network to be deployed is relatively small compared to many other jurisdictions and so it is important to compare the NBP network with similar size deployments. A unique aspect of the NBP related to scale is the requirement for Bidder's network to traverse the Excluded Area, without providing any services to RSPs in that area (see following section).

5.2 Relevant costs of the FT PCM for CPPP benchmarking

The CPPP usually includes the cost of the infrastructure to deploy the network as well as the cost of the civil works but excludes costs such as OSS/BSS, active equipment and any overhead costs.

Therefore, to establish a like-for-like comparison, it is first important to extract the relevant costs of the FT PCM which qualify for the CPPP. We illustrate our approach of defining the CPPP costs from the FT PCM in Figure 5.1.

Figure 5.1: FT PCM relevant build cost for CPPP comparison [Source: Analysys Mason, 2018]

In order to derive the CPPP from the FT PCM, we start with the initial capex to pass of ███████ █████ (see Section 4.3.3, Figure 4.4). In order to compare with the CPPP with that of other jurisdictions, we remove the following cost components:

- SCP capex
- Buildco Staff
- Buildco Overheads
- Excluded Area (EA) capex

We explain the rational for removing each of the above cost components from the initial capex to pass to derive the CPPP in the following sub-sections:

Special Community Points (SCP) capex

We first remove the cost associated with the installation of the temporary wireless network in Years 1 and 2 to pass the SCPs. This is because the requirement to deploy a temporary infrastructure for priority SCPs in areas where the FTTP network will not have been deployed by the end of Year 2, is specific to the NBP and not applicable to any other benchmark.

Buildco Staff

NBPco has created a new company to manage the initial build of the NBP Network, called Buildco. The Buildco staff costs category in the FT PCM relates the following staff functions:

- Build Design Authority
- Build Head of Commercial
- Control/ Admin
- Build Program/ Project office
- Manager/team leads
- Senior Management
- Executive management
- Contractors
- Public Relations & Comms
- Legal (Wayleaves)
- Financial Accounts Management
- Finance / Capex / Supply Chain / Procurement Analyst
- Advisors

For CPPP benchmark purposes, all overhead costs are usually removed and only the cost of staff directly involved in the deployment of the network is considered. Therefore, for CPPP comparison, we have removed the cost associated with the following overhead staff:

- Control/ Admin
- Senior Management
- Executive management
- Public Relations & Comms
- Legal (Wayleaves)
- Financial Accounts Management
- Finance / Capex / Supply Chain / Procurement Analyst
- Advisors

The costs removed from the initial capex to pass for the above categories of overhead staff amounts to ▮▮▮▮▮▮

Buildco Overheads

As part of their initial capex to pass, NBPco have also included the following overhead costs:

- Performance Bond
- Insurance
- Office Lease and Overhead
- Professional Fees (Accounting, Legal, Admin, etc.)
- Communications / Public Relations (External)
- Staff / Vendor / Customer Entertainment

Typically, such costs are not included as part of the CPPP as these costs are considered to be overhead costs. Therefore, these costs have been removed from the initial capex to pass as they are not relevant for the CPPP benchmark comparison.

Excluded Area capex

For the NBP, the Bidder will deploy a network from OLT locations (e.g. eir exchanges and e|net PoPs) to premises located in the Intervention Area. OLT locations are usually located in urban or sub-urban areas, and therefore not in the Intervention Area. As a result, the network deployed by the Bidder to reach the Intervention area has to traverse the Excluded Area, without providing any services to RSPs in that area[39]. This means that the Bidder will deploy a longer network length per premises passed compared with other benchmark FTTP networks.

Therefore, the capex associated with the Excluded Area was removed from the initial capex to pass to derive the NBP network CPPP.

5.3 CPPP benchmarking

As illustrated in Section 5.2, for CPPP comparison, the relevant build cost in the Bidder FT PCM is ▮▮▮▮▮▮▮▮. Since the Bidder is planning to pass 535k existing premises, the CPPP for the NBP network ($CPPP_{NBP}$) can be calculated as follows:

$$CPPP_{NBP}= \text{▮▮▮▮▮▮▮▮▮▮▮▮} \text{ EUR per premises passed}$$

In Figure 5.2 we have compared the $CPPP_{NBP}$ with that of FTTH networks in Western Europe. In selecting our benchmarks, we excluded Norway and Switzerland where the CPPPs are disproportionately higher due to higher labour costs. We have classified the CPPPs into two different geotypes:

- Urban and sub-urban deployments (blue) and;
- Rural deployments (green).

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[39] The Bidder has confirmed that it will not connect any end-users in the Excluded Area using the infrastructure deployed for the NBP.

Figure 5.2: Cost per premises passed for selected FTTP networks in Europe [Source: Analysys Mason, 2018]

The average CPPP across all benchmarks we have selected is EUR583 per premises passed, which is lower than $CPPP_{NBP}$. At ████████, $CPPP_{NBP}$ is the highest of all benchmarks considered. However, the Irish NBP is deployed in a rural geotype, and therefore the applicable CPPPs are those for networks which have also been deployed in rural geotypes.

In the benchmark provided in Figure 5.2, the three FTTP networks categorised as rural are:

- Public Initiate Networks (France)
- Asturcon Network (Spain)
- Gigaclear network (UK)

Public initiative networks in France

The French national broadband plan *France Très Haut Débit* (FTHD) was launched in 2013. According to this plan, fast and ultra-fast broadband were expected to cover the entire French territory by 2022. However, in late 2017, the French government announced an acceleration of the plan and set its broadband targets to 100% ultra-fast broadband coverage by 2022 (>30Mbps).

It is understood that private operators and local authorities will invest around EUR13 – 14 billion (half of which will be financed through public subsidies) in rural areas to cover 43% of the population, or 13 million premises.

Asturcon Network (Spain)

Asturcon is a Spanish FTTP network in the principality of Asturias which was rolled out with support from public funding. The network is publicly owned via a company called GIT and is operated on a carrier neutral basis.

The network passes 52,000 premises and its offerings include a symmetrical 100 Mbit/s service.

Gigaclear network (UK)

Gigaclear is a small UK operator specialised in providing FTTP based services in rural areas of the UK. Gigaclear was selected for 16 BDUK lots across 7 council areas including:

- Herefordshire
- Devon
- Somerset
- Berkshire

In February 2018, Gigaclear had passed a total of 60,000 premises and had 15,000 connections.

5.4 Conclusions

As discussed in section 5.2, the CPPP for FTTP networks in urban areas is significantly lower that for rural areas.

███████████████████████████████████████ However even these networks do not address the last few percent of premises (i.e. the most rural) as is the case for the NBP in Ireland.

In our view, the implied CPPP for the NBP is reasonable compared with similar European FTTH benchmarks when accounting for the highly rural nature of the NBP Intervention Area.

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6 Conclusion

6.1 Introduction

Overall, we believe that the Technical solution is robust, and that most cost items are broadly in line with what we would expect. ██

6.2 Detailed findings

Excluding margin and contingency, the total cost in the Bidder FT PCM is ████████████ that of the Budget Cost Model. This relatively small headline figure disguises significant cost differences within certain subcategories ██.

Despite the differences in underlying network design between the Budget Cost Model and the Bidder FT PCM, we conclude that most of the key volumes (relating to premises, network infrastructure and resources) in the Bidder FT PCM are robust and hence those parts of the Bidder's response relating to volume are acceptable.

The total capex to pass compares well with the BCM, a view which is supported by the CPPP benchmarking analysis. ██

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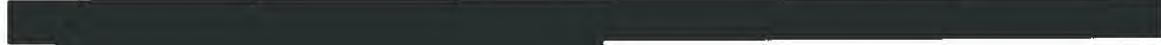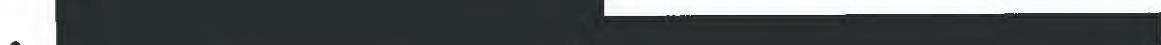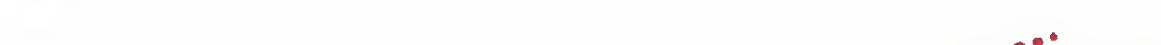
We observe significant differences in terms of capex to connect mainly due to the fact that:

- The Bidder FT PCM assumes ████████ connections than the Budget Cost Model
- The Bidder FT PCM assumes a capex to connect per premises that is ████████ than in the Budget Cost Model

The main reason for the difference in capex to connect per premises is attributed to

6.3 Key recommendations

We recommend DCCAE to:

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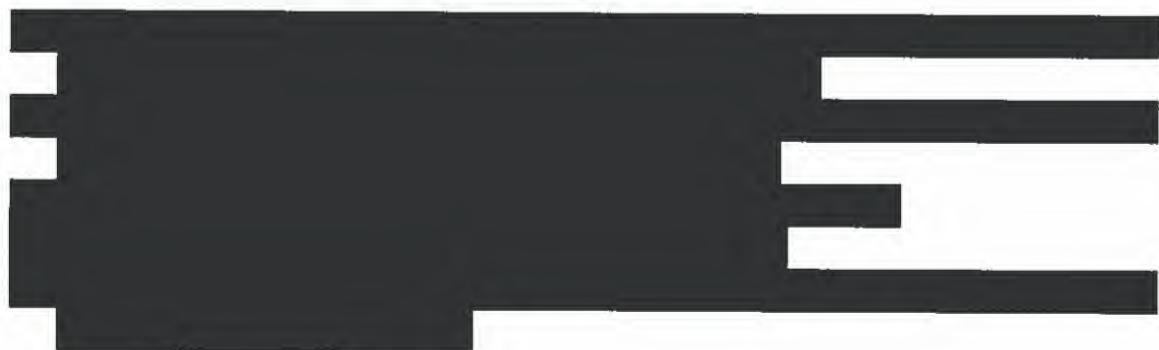
Annex A Volume comparisons by network segment

Figure A.1 compares the volumes for the **network to pass** in the Bidder FT PCM with those in the Benchmark Network Design.

Figure A.1: Network volume comparison for the network to pass [Source: The Bidder, Tera, Analysys Mason, 2018]

	Benchmark Network Design		Bidder FT PCM	
	Total	Of which new	Total	Of which new
Total Network length (km)	■	■	■	■
Total UG network length (km)	■	■	■	■
UG network in Excluded Area	■	■	■	■
UG network in Intervention Area	■	■	■	■
Total OH network length (km)	■	■	■	■
OH network in Excluded Area	■	■	■	■
OH network in Intervention Area	■	■	■	■
Total # of poles	■	■	■	■
# of poles in Excluded Area	■	■	■		
# of poles in Intervention Area	■	■	■	■

Figure A.2 compares the network volumes for the **network to connect** in the Bidder FT PCM with those in the Benchmark Network Design.

Figure A.2: Network volume comparison for the network to connect [Source: The Bidder, Tera, Analysys Mason, 2018]

	Benchmark Network Design		Bidder FT PCM	
	Total	Of which new	Total	Of which new
Total Network length (km)	■	■	■	■
Total UG network length (km)	■	■	■	■
UG network in Excluded Area	■			
UG network in Intervention Area	■	■	■	■
Total OH network length (km)	■	■	■	■
OH network in Excluded Area	■	■		
OH network in Intervention Area	■	■	■	■
Total # of poles	■	■	■	■
# of poles in Excluded Area	■	■		
# of poles in Intervention Area	■	■	■	■

Annex B   Benchmarking of unit costs

In this annex, we define the impact of driving unit costs, as identified in Figure 4.8 of section 4.4.2, in the Bidder FT PCM, and excluding cable unit cost as these are analysed in detail in section 4.4 of this report. For this we compare the unit costs assumed by the Bidder in its PCM with the unit costs assumed in the BCM 2018. Our unit cost analysis is carried out after discounts but excludes the margins and contingencies applied by the Bidder. To simplify the tables, we show only the unit costs for the most frequently used type for each item however, in estimating the capex impact, we have adjusted all item types accordingly.

Figure B.3: Key unit cost comparison between the Bidder FT PCM and the Budget Cost Model [Source: Analysys Mason, 2018]

Line item	Unit	Bidder FT PCM unit cost	Budget Cost Model unit cost	Capex impact vs Bidder FT PCM if unit cost from Budget Cost Model is used	
				Pass network	Connect network
Aerial Fibre cable 12f	EUR per m	▉	▉	▉	▉
Poles 8.5M C1	EUR per pole	▉	▉	▉	▉
Joints (incl. splice labour)	EUR per location	▉	▉	▉	▉
Splitters (incl. ODP and splice labour)	EUR per location	▉	▉	▉	▉
Trench	EUR per m	▉	▉	▉	▉
ONT	EUR per connection	▉	▉	▉	▉

From the above figure, it can be seen that:

- For pole costs, the combined unit cost in the Bidder FT PCM is up to ▉ than in the Budget Cost Model. If the unit cost of the BCM were used in the PCM for poles, it would potentially ▉ the capex to pass by ▉ and the capex to connect by the same amount.

- For joints (incl. splice labour) the combined unit cost in the Bidder FT PCM is ▉ than in the Budget Cost Model. If the unit cost of the BCM were used in the PCM joints, it would ▉ the capex to pass by ▉ .

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[40]   To ensure a like-for-like comparison, we have modified the ONT unit cost from the Budget Cost Model to exclude the cost associated with performance monitoring

- For splitters (incl. ODP and splice labour), the combined unit cost in the Bidder FT PCM is ▮▮ ▮▮ than in the Budget Cost Model. If the unit cost of the BCM were used in the PCM for splitters, it would ▮▮ the capex to pass by ▮▮

- For trench costs, the combined unit cost in the Bidder FT PCM is up to ▮▮ than in the Budget Cost Model depending on the surface used (with the 20% difference applying to carriageway trench). If the unit cost of the BCM were used in the PCM for trenches, it would ▮▮ the capex to pass by a negligible amount

- For ONTs, the unit cost in the Bidder FT PCM (materials only in this case) is ▮▮ in the Budget Cost Model. This is mainly because the ONTs assumed in the Budget Cost Model are 2.5G GPON ONTs while the Bidder FT PCM assumes more futureproof 10G XGS-PON ONTs.

In terms of indexation, the main difference between the Bidder FT PCM and the Budget Cost Model is that the former assumes a ▮▮ price inflation per annum for materials while the latter assumes a ▮▮ ▮▮ except for trench, poles and ONTs where the latter assumes price indexations of ▮▮ ▮▮ respectively.

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